

WE CLAIM:

1) A staged method of forming vinyl copolymer by solution polymerization which comprises:

5 a) charging a positive amount up to 90% of at least two vinyl monomers of said vinyl copolymer to a first stage reaction zone;

b) polymerizing said at least two vinyl monomers in the first stage reaction zone to about 10 to 90% conversion in the presence of an
10 initiator at an initiator to monomers mole ratio of about $1 \times 10^{-4}:1$ to $5 \times 10^{-2}:1$, the monomer content of one of the at least two vinyl monomers of the copolymer formed in the first stage being higher than the content of another of the at least two
15 vinyl monomers in said first stage polymer, the weight average molecular weight of the first stage copolymer being about 2000 to 500,000 Daltons; and

c) continuing polymerization in the presence of an initiator in a second stage while
20 continuously adding the balance of the monomers of said vinyl copolymer to the polymerization reaction mixture of the first stage at a monomers ratio lower in said one monomer than in the first stage monomers ratio, the initiator to monomers mole
25 ratio in the second stage being different than in the first stage;

the vinyl copolymer formed gradually continuously changing in molecular weight from the first stage and increasing in concentration of said
30 one monomer during the second stage, the weight average molecular weight of the total copolymer of the first stage and the second stage being about 2000 to 250,000 Daltons.

2) The process of claim 1 wherein the
35 initiator to monomers ratio in the first stage is between $5 \times 10^{-4}:1$ and $2 \times 10^{-2}:1$.

3) The process of claim 2 wherein the vinyl copolymer is an acrylate copolymer, said at least two monomers comprise ethyl acrylate and 2-ethylhexyl acrylate and said one monomer is 2-ethylhexyl acrylate.

4) The process of claim 3 wherein the monomers in the first stage are charged to the first stage at one time.

5) The process of claim 4 wherein said at least two monomers includes fluorinated acrylate monomer.

6) The acrylate copolymer product of the process of claim 3.

7) The acrylate copolymer product of the process of claim 5.

8) The acrylate copolymer of claim 6 wherein the monomers in the copolymer comprise 10 to 20 wt. % ethyl acrylate and 90 to 20 wt. % 2-ethylhexyl acrylate.

9) The acrylate copolymer product of claim 7 comprising 10 to 80 wt. % ethyl acrylate, 20 to 90 wt. % 2-ethylhexyl acrylate and 0 to 20 wt. % fluorinated acrylate.